

EXHIBIT C

**TO THE DECLARATION OF ARPITA
BHATTACHARYYA IN SUPPORT OF ASETEK
DANMARK A/S'S MOTION FOR PARTIAL
SUMMARY JUDGMENT**

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ASETEK DANMARK A/S,
Petitioner,

v.

COOLIT SYSTEMS, INC.,
Patent Owner.

IPR2020-00825
Patent 10,274,266 B2

Before FRANCES L. IPPOLITO, SCOTT C. MOORE, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Granting Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

I. INTRODUCTION

Asetek Danmark A/S (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1, 2, 4, 5, 9, and 13–15 of U.S. Patent No. 10,274,266 B2 (Ex. 1001, “the ’266 Patent”). Paper 2 (“Pet.”). CoolIT Systems, Inc. (“Patent Owner”) filed a preliminary response. Paper 6. Pursuant to our authorization, Petitioner filed a reply to Patent Owner’s preliminary response (Paper 7), and Patent Owner filed a sur-reply in support of its preliminary response (Paper 10). We instituted an *inter partes* review as to all claims and grounds set forth in the Petition. Paper 12 (“Institution Decision”).

After institution, Patent Owner filed a response to the Petition (Paper 25, “Response” or “Resp.”), Petitioner filed a reply to the response (Paper 28, “Reply”), and Patent Owner filed a sur-reply (Paper 34, “Sur-Reply”). In addition, Patent Owner filed a motion to exclude (Paper 35, “Motion to Exclude”), Petitioner filed an opposition to the motion to exclude (Paper 38), and Patent Owner filed a reply in support of the motion to exclude (Paper 43). An oral hearing was held on June 22, 2021, and a transcript of the hearing is in the record. Paper 49 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, 5, and 9 are unpatentable, but has not shown by a preponderance of the evidence that claims 13–15 are unpatentable. We also grant Patent Owner’s Motion to Exclude.

IPR2020-00825

Patent 10,274,266 B2

A. Related Matters

Patent Owner sued Petitioner for infringement of the '266 Patent in *Asetek Danmark A/S v. CoolIT Systems, Inc.*, Case No. 3:19-cv-00410-EMC (N.D. Cal) (the “district court case”). Pet. 106. Petitioner points out that the '266 Patent is related to issued patents U.S. 9,909,820 B2, U.S. 9,453,691 B2, and U.S. 8,746,330 B2. *Id.* at 106.

The '266 Patent, filed March 5, 2018, as U.S. Application 15/912,478, is a continuation of U.S. Patent No. 9,909,820 B2, which is a continuation of U.S. Patent No. 9,453,691 B2, which is a continuation-in-part of U.S. Patent No. 8,746,330 B2 (Ex. 1004, “the '330 Patent”). Ex. 1001, codes (21), (22), (63). The '330 Patent issued from U.S. Application No. 12/189,476, which was published as U.S. Publication No. 2009/0071625 A1. *Id.*; Ex. 1011 (“Lyon”), codes (10), (21), (43).

The '266 Patent claims priority to U.S. Provisional Application No. 61/512,379 (Ex. 1006, “the 2011 Provisional”) and U.S. Provisional Application No. 60/954,987 (Ex. 1005, “the 2007 Provisional”). Ex. 1001, code (60); *see also* Paper 6, 9.

Patent Owner points out that the “[t]he Board confirmed patentability of all challenged claims of the '330 patent . . . in a Final Written Decision following trial on the merits” in IPR2015-01276. Paper 6, 44.

On March 26, 2020, Petitioner filed a separate petition requesting *inter partes* review of claims 1, 2, 3, 5, 7, 25 of U.S. Patent No. 9,057,567 B2 (“the '567 Patent”). *See* IPR2020-00747 (“the '747 IPR”), Papers 2, 3.¹ The '567 Patent is a continuation of U.S. Application No. 10/166,657, which

¹ Petitioner also originally challenged claim 28, but Patent Owner subsequently filed a statutory disclaimer of that claim, eliminating it from the proceeding. *See* '747 IPR, Paper 42, 6.

IPR2020-00825

Patent 10,274,266 B2

is a continuation of U.S. Application No. 13/401,618, which is a continuation-in-part of the '330 Patent. *Id.*, Paper 2, 21. We issued a final written decision in the '747 IPR determining that Petitioner had shown by a preponderance of the evidence that all challenged claims of the '567 Patent were unpatentable. '747 IPR, Paper 42 (Sept. 30, 2021).

B. The '266 Patent

The '266 Patent is generally directed to a fluid heat exchange system for accepting and dissipating thermal energy to cool electronic and other devices. Ex. 1001, 1:20–28.

Figure 1, reproduced below, depicts such a system.

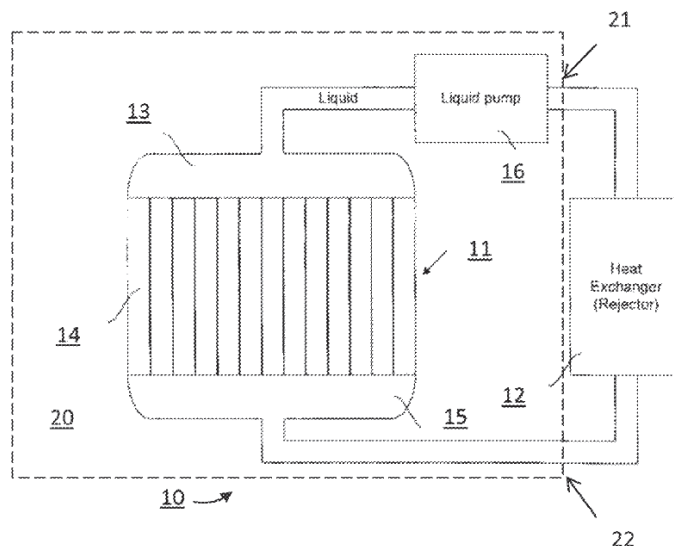


FIG. 1

Figure 1 is a diagram of a fluid circuit configured to transfer heat using a circulating liquid. Ex. 1001, 5:31–32. In Figure 1, liquid circulates through fluid circuit 10 by entering inlet 21, moving through heat exchanger 11, and exiting outlet 22. *Id.* at 6:56–67, 7:44–67. Heat exchanger 11 has manifolds 13, 15 and passages 14. *Id.* at 7:55–60.

Figure 2, reproduced below, depicts an exemplary embodiment of a heat exchanger.

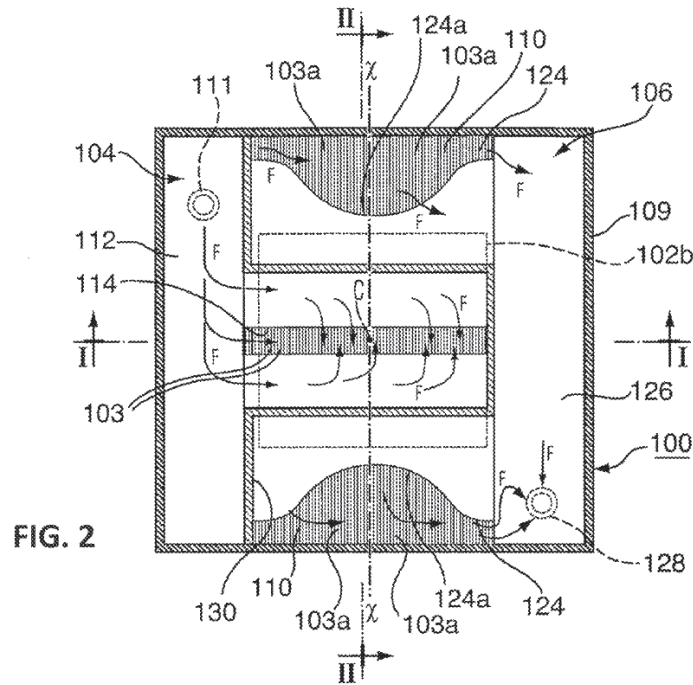


Figure 2 is a top plan view of internal components of fluid heat exchanger 100. Ex. 1001, 5:33–35. Fluid heat exchanger 100 includes housing 109, inlet port 111, fluid inlet passage 104, inlet opening 114, microchannels 103, seal 130, fluid outlet opening 124, fluid outlet passage 106, and outlet port 128. *Id.* at 8:3–9, 9:35–11:9, 12:19–22. Each microchannel 103 is defined by a recessed groove extending transversely between adjacent fins. *Id.* at 2:45–48. Heat exchanging fluid F flows in the directions indicated by the arrows. *Id.* at 11:50–53. Heat exchanging fluid F enters microchannels 103 and splits into two sub flows in opposite directions to pass outwardly from inlet opening 114 towards outlet fluid opening 124. *Id.* at 11:34–12:2.

IPR2020-00825

Patent 10,274,266 B2

Figure 4, reproduced below, shows a sectional view along line II–II of Figure 2. Ex. 1001, 5:36.²

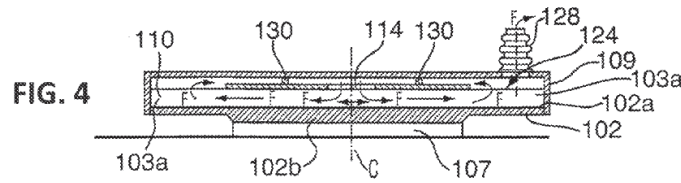
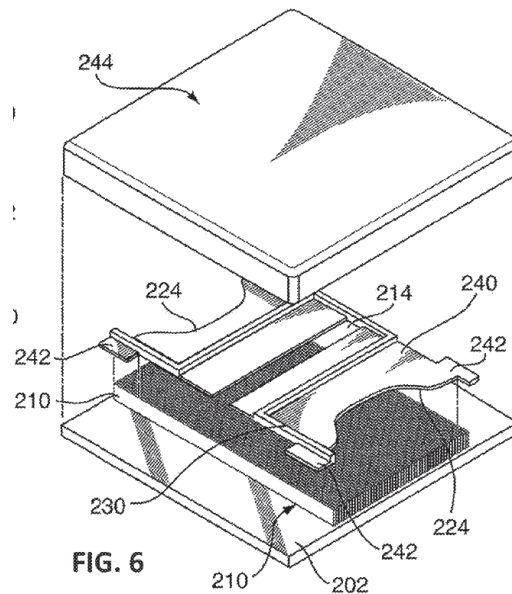


Figure 4 depicts housing 109 including heat spreader plate 102 (which operates as an outer limit of a heat sink), and heat exchanging fluid F flowing in two opposite directions within microchannels 103. *Id.* at 8:3–9, 11:34–12:2. Seal 130 separates fluid inlet passage 104 from fluid outlet passage 106 so that fluid F must pass through microchannels 103 and past surface 102a of heat spreader 102. *Id.* at 12:19–22.

Figure 6, reproduced below, shows an exploded perspective view of an embodiment of a heat exchanger.



² The '266 Patent incorrectly refers to “line II–II of FIG. 3” rather than “of FIG. 2.” Ex. 1001, 5:37.

IPR2020-00825

Patent 10,274,266 B2

Ex. 1001, 5:38–41.³ The depicted heat exchanger has inlet opening 214, plate 240, seal 230, and heat spreader plate 202. *Id.* at 12:26–46. “Seal 230 may be installed as a portion of plate 240 or separately.” *Id.* at 12:43–44.

C. *Challenged Claims*

Petitioner challenges claims 1, 2, 4, 5, 9, and 13–15. Claims 1 and 13 are independent claims. Claim 1, reproduced below, is representative.

1. A heat exchange system comprising:

a housing defining a recessed region and an outlet port fluidically coupled with the recessed region;

a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;

a manifold body at least partially defining an opening overlying the microchannels,

wherein the manifold body defines a pair of compliant surfaces flanking the opening,

wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,

wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,

wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and

³ The '266 Patent incorrectly identifies Figure 5 as an exploded, perspective view and Figure 6 as a top plan view without a top cap. Ex. 1001, 5:38–41.

IPR2020-00825

Patent 10,274,266 B2

wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.

Ex. 1001, 19:62–20:20.

D. Challenged Claims and Asserted Grounds

Petitioner asserts the following unpatentability grounds (Pet. 23–105):

Claim(s) Challenged	35 U.S.C. §⁴	Reference(s)/Basis
1, 9	102(b)	Bezama ⁵
1, 9	103(a)	Bezama and Lyon ⁶
2, 4, 5	103(a)	Bezama and Chiang ⁷
2, 4, 5	103(a)	Bezama, Lyon, and Chiang
13–15	103(a)	Kang ⁸
13–15	103(a)	Anderson ⁹

⁴ The '266 Patent issued from an application filed March 5, 2018 and claims priority to the 2007 and 2011 Provisionals. *See* Ex. 1001, codes (22), (60). Thus, the pre-AIA version of 35 U.S.C. §§ 102 and 103 apply in this case. Leahy–Smith America Invents Act, Pub. L. No. 112–29, §3(c), 125 Stat. 284, 293 (2011) (explaining that the pre-AIA version of the Patent Act generally applies to patents with effective filing dates before March 16, 2013).

⁵ U.S. Pat. Appl. Pub. No. 2010/0012294 A1, published Jan. 21, 2010 (Ex. 1010, “Bezama”).

⁶ U.S. Pat. Appl. Pub. No. 2009/0071625 A1, published Mar. 19, 2009 (Ex. 1011, “Lyon”).

⁷ U.S. Pat. No. 7,688,589 B2, issued Mar. 30, 2010 (Ex. 1013, “Chiang”).

⁸ U.S. Pat. Appl. Pub. No. 2006/0096738 A1, published May 11, 2006 (Ex. 1014, “Kang”).

⁹ U.S. Pat. Appl. Pub. No. 2008/0301941 A1, published Dec. 11, 2008 (Ex. 1015, “Anderson”).

II. ANALYSIS

A. *Principles of Law*

1. *Burden*

In an *inter partes* review, the burden of proof is on the petitioner to show that the challenged claims are unpatentable, and that burden never shifts to the patentee. *See* 35 U.S.C. § 316(e); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016) (citing *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015)).

2. *Anticipation*

For a claim to be found unpatentable under 35 U.S.C. § 102, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). “A reference anticipates a claim if it discloses the claimed invention ‘such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention.’” *In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995) (emphasis omitted).

3. *Obviousness*

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person of ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art;

(3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.¹⁰ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In determining obviousness when all elements of a claim are found in various pieces of prior art, “the factfinder must further consider the factual questions of whether a person of ordinary skill in the art would be motivated to combine those references, and whether in making that combination, a person of ordinary skill would have had a reasonable expectation of success.” *Dome Patent L.P. v. Lee*, 799 F.3d 1372, 1380 (Fed. Cir. 2015); *see also WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1355 (Fed. Cir. 1999) (“When an obviousness determination relies on the combination of two or more references, there must be some suggestion or motivation to combine the references.”). “Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant’s disclosure.” *In re Dow Chemical Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988).

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“the level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention”).

Petitioner asserts that a person of ordinary skill in the art at the time of the invention of the ’266 Patent (a “POSITA”) would have had the following education and experience: (i) “completed college level course work in

¹⁰ Patent Owner does not contend that any such objective evidence is present in this case. *See generally* Resp. (not alleging that any objective indicia are present); *see also* Ex. 1003 ¶ 224 (“I am not aware of any secondary indicia of non-obviousness tied to the claimed invention.”).

thermodynamics, fluid mechanics, and heat transfer,” and (ii) “attained two or more years of experience in designing liquid cooling systems for computers, servers, or other electronic devices, or very similar technology, or one with a more advanced degree in the above fields may have had less practical experience.” Pet. 9.

Patent Owner contends that a POSITA “would have earned at least a bachelor’s degree, such as a B.S. (bachelor of science), or equivalent thereof, in mechanical engineering or a closely related field and possessed at least three years of specialized experience in heat transfer devices for thermal management in electronics and computer systems, or in similar systems.” Resp. 3. Patent Owner represents, however, that none of its arguments or its declarant’s opinions turn on any differences between the parties’ alternative formulations concerning the level of ordinary skill in the art. *Id.* at 3 n.1.

In its Reply, Petitioner does not respond to Patent Owner’s alternative formulation, or identify any issues in this case that might turn on differences between the parties’ alternative formulations. *See generally* Reply.

On this record, we adopt Petitioner’s proposed formulation regarding the level of ordinary skill in the art, which we find is consistent with the level of skill reflected in the cited prior art references. *See Okajima*, 261 F.3d at 1355. We note, however, that the differences between the parties’ proposed formulations are not material with respect to any disputed issue. All of the findings and conclusions expressed herein would have been the same had we instead applied Patent Owner’s proposed formulation.

C. Claim Construction

We construe claims using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C.

§ 282(b). 37 C.F.R. § 42.100 (2019). In applying this claim construction standard, we are guided by the principle that the words of a claim “are generally given their ordinary and customary meaning,” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (*en banc*) (citation omitted). When construing a claim term, “we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). There is a “heavy presumption,” however, that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

Petitioner proposes constructions for the following terms (Pet. 9–15):

“exhaust manifold” in claims 1 and 5,
“aperture in the plate” in claim 13,
“outlet opening” in claim 15,¹¹ and
“seal” in claim 13.

Patent Owner proposes a different construction for the term “seal,” asserts that we need not construe “exhaust manifold,” and asks us to give the claim terms “outlet opening” and “aperture in the plate” their plain and ordinary meanings. Resp. 14–17. Patent Owner also asks us to construe the claim term “microchannels.” *Id.* at 20.

¹¹ The Petition asserts that “outlet opening” appears in claims 13 and 15 (*see* Pet. 13), but claim 13 does not recite an outlet opening (*see* Ex. 1001, 21:8–36).

1. *Seal*

Petitioner contends that a POSITA would understand “seal” to mean “the housing and the plate are fitted so that fluid cannot flow between them.” Pet. 13 (citing Ex. 1003 (Tilton declaration) ¶ 60). Petitioner further contends that a “seal” can be formed by placing two components in “fluid-tight contact and/or fusing those components together,” and that a seal does not itself need to be “a component.” Pet. at 13–14 (citing Ex. 1003 ¶ 60).

Patent Owner contends that we should reject Petitioner’s proposed construction, and instead construe “seal” as the district court allegedly did in *Asetek Danmark A/S v. CoolIT Systems, Inc.*, Case No. 19-cv-00410-EMC (N.D. Cal.). See Resp. 16–17 (citing Ex. 2029 (district court claim construction order), 42–44). Patent Owner further clarifies that its proposed construction, “a component that fills a gap to prevent leakage through the gap,” requires that the seal be “a structure,” a “part,” or a “component.” See *Id.* at 17–20.

We begin our analysis with the claims. Claim 13 recites “a seal, wherein the seal is a portion of the plate” (see Ex. 1001, 21:15), and the specification frequently uses the term “seal” to describe a component (see *id.* at 12:19–20 (describing the seal as a component that separates passages), 12:43–46 (describing the seal as a component that may be part of plate 240 or separate); 13:15–16 (stating that the seal can be “e.g., an O-ring”)). The claim’s recitation of “a seal, wherein the seal is a portion of the plate” does not merely describe a state in which the plate and the housing are fitted together in a way that prevents fluid flow, as Petitioner suggests. This claim language recites that the “seal” is a physical portion or component of the recited plate, which is consistent with the district court construction proposed by Patent Owner.

We also note that claim 13 does not recite a housing, and neither party has identified any lexicographic definition or explicit disclaimer of claim scope that would be sufficient to limit the scope of claim 13 so as to require a housing. *See* Pet. 13–15; Resp. 16–20. Petitioner’s proposed construction, which requires a housing, is inappropriate for this additional reason.

The district court’s construction also more accurately captures additional aspects of the recited seal. Both parties make clear in their constructions that a seal prevents or blocks fluid flow or leakage. *See* Pet. 13; Resp. 17. Claim 13 also provides that the seal “separates the fluid inlet passage from the fluid outlet passage.” Ex. 1001, 21:26–28. Thus, the seal of claim 13 at least partially fills the space, or gap, between the fluid inlet passage and the fluid outlet passage. For each of these reasons, the district court’s construction, “a component that fills a gap to prevent leakage through the gap,” accurately describes the nature of the seal recited in claim 13. Accordingly, we adopt the district court’s construction and apply it in this proceeding.

One additional clarification is appropriate in view of the evidence and arguments put forth by the parties in this proceeding. The specification of the ’266 Patent makes clear that a “seal” need not completely eliminate leakage in order to constitute a “seal.” *See* Ex. 1001, 13:16–20 (describing a seal that is positioned “to reduce and/or eliminate leakage of the working fluid.”) Accordingly, though the function of a seal is to prevent leakage, we determine that a seal need not completely eliminate leakage.

2. *Other Claim Terms*

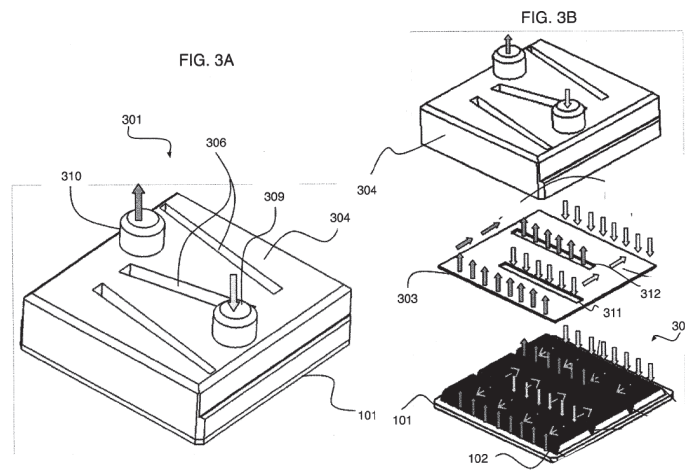
On this record, and except to the extent we address the meaning of claim terms in the analysis below, we decline to further construe any claim terms. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803

(Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

D. Overview of the Asserted References

1. Bezama (Ex. 1010)

Bezama is a reference entitled “Structure and Apparatus for Cooling Integrated Circuits Using Co[p]per Microchannels.” Ex. 1010, Title. Figures 3A and 3B, reproduced below, describe such an apparatus.



Figures 3A and 3B are perspective views of an assembly for cooling integrated circuits according to an exemplary embodiment. Ex. 1010 ¶ 13. Assembly 301 includes a cover/manifold portion 304 having inlet port 309, outlet port 310, and recesses 306. *Id.* ¶ 26. Assembly 301 also includes separator sheet 303 and fin portion 302. *Id.* ¶¶ 26, 28.

2. Lyon (Ex. 1011)

Lyon is a reference entitled “Fluid Heat Exchanger.” Ex. 1011, Title. Lyon is a publication of U.S. Application No. 12/189,476 which matured as

the '330 Patent, as discussed previously. *Id.* at code (60). As Lyon is related to the '266 Patent, Lyon's heat exchanger has similar components as that of the '266 Patent.

Figure 1, reproduced below, shows a heat exchanger according to an exemplary embodiment.

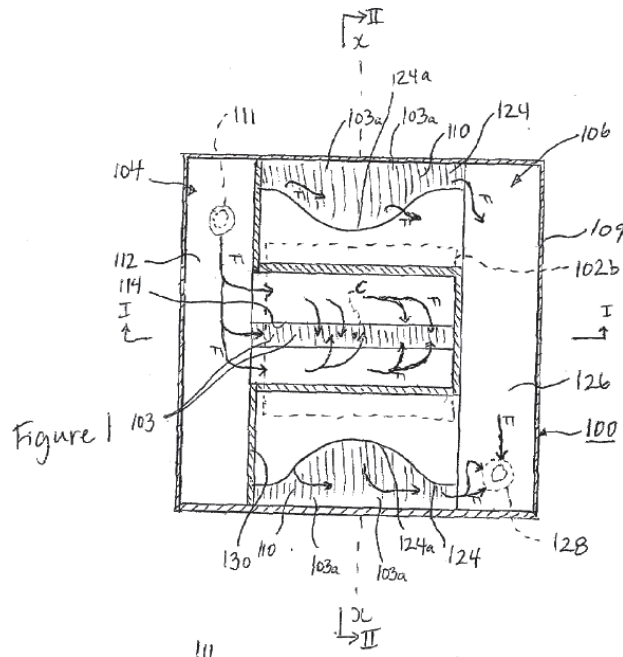


Figure 1 is a top plan view of internal components of heat exchanger 100.

Ex. 1011 ¶¶ 9, 15. Heat exchanger 100 includes housing 109, inlet port 111, fluid inlet passage 104, inlet opening 114, microchannels 103, seal 130, fluid outlet opening 124, fluid outlet passage 106, and outlet port 128. *Id.* ¶¶ 15, 17, 21, 28, 37. Heat exchanging fluid F flows in the directions indicated by the arrows. *Id.* ¶ 35. Heat exchanging fluid F enters microchannels 103 and splits into two sub flows in opposite directions to pass outwardly from inlet opening 114 toward outlet fluid opening 124. *Id.* ¶¶ 34–35. Seal 130 separates fluid inlet passage 104 and fluid outlet passage 106 so that fluid must pass through microchannels 103. *Id.* ¶ 37.

Figure 5, reproduced below, shows a heat exchanger according to another embodiment.

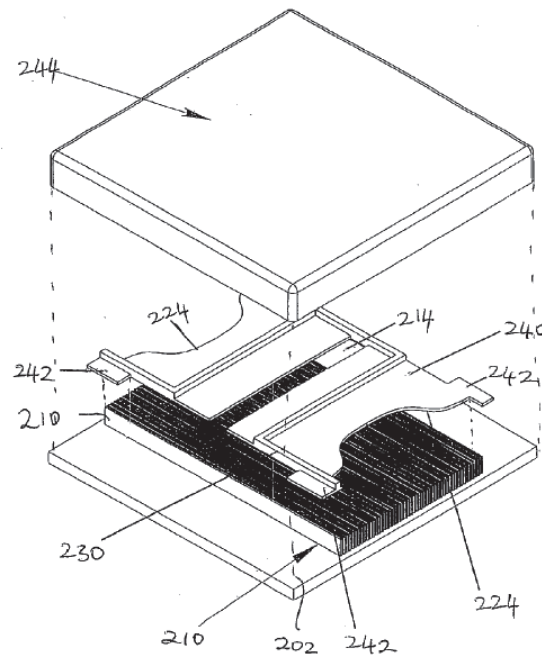


Figure 5

Figure 5 is an exploded, perspective view of a heat exchanger. Ex. 1011 ¶ 13.¹² The depicted heat exchanger includes top cap 244 with side walls that extend downward, plate 240, seal 230, walls 210, and heat spreader plate 202. *Id.* ¶¶ 38, 40–42. “Seal 230 may be installed as a portion of plate 240 or separately.” *Id.* ¶ 41. Plate 240 “has portions removed to create inlet and outlet openings.” *Id.* ¶ 40.

3. *Chiang (Ex. 1013)*

Chiang is entitled “Water Cooled Heat Dissipation Module for Electronic Device.” Ex. 1013, Title. Figure 1, reproduced below, shows a

¹² Lyon incorrectly identifies Figure 4 as an exploded, perspective view and Figure 5 as a top plan view without a top cap. Ex. 1011 ¶¶ 12–13.

IPR2020-00825

Patent 10,274,266 B2

water cooled heat dissipation module according to an exemplary embodiment. *Id.* at 2:25–27.

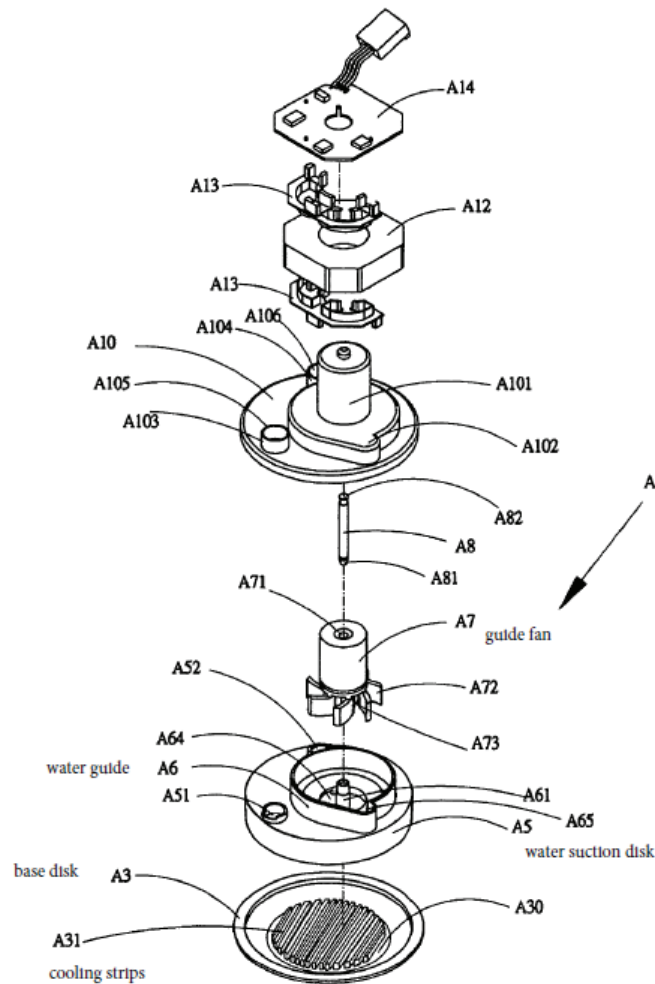
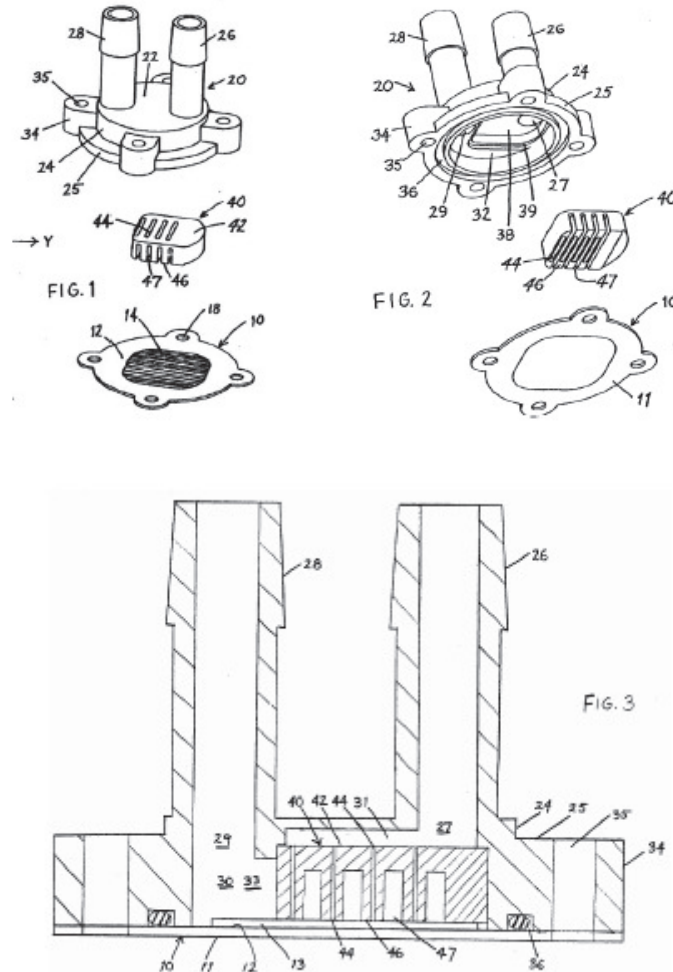


FIG. 1

The water cooled heat dissipation module of Figure 1 includes guide fan A7, water suction disk A5, and base disk A3. *Id.* at 2:51–57. Water suction disk includes water guide A6, and base disk A3 includes cooling strips A31. *Id.* In operation, coolant enters from an inlet port to water guide A6, is driven by guide fan A7, moves through channels formed by cooling strips A31, and exits from an outlet port. *Id.* at 3:34–49, 3:62–4:3, 4:4–8.

4. *Kang (Ex. 1014)*

Kang is entitled “Liquid Cold Plate Heat Exchanger.” Ex. 1014, Title. Figures 1–3 of Kang are reproduced below.



Figures 1 and 2 depict exploded top and bottom perspective views, respectively, of a heat exchanger, and Figure 3 depicts a section view of the heat exchanger of Figure 1. *Id.* ¶¶ 19, 21, 22. The depicted embodiments include cooling plate 10 having heat collection surface 11 for placing against an object to be cooled, and opposing heat transfer surface 12. *Id.* ¶ 28. Heat transfer surface 12 includes an array of parallel microfins 14 upstanding from surface 12. *Id.*

Cover 20 fits over cooling plate 10 and includes inlet nipple 26, outlet nipple 28, and recesses 32 and 38 for receiving flow distributor 40. Ex. 1014 ¶ 28. When flow distributor 40 is received in the recesses of cover 20 and fitted over cooling plate 10, inlet section 31 and outlet section 33 are formed. *Id.* ¶¶ 28–29. Flow distributor 40 includes parallel slots 44 (inlet channels) extending between inlet section 31 and outlet section 33. *Id.* ¶ 29. Flow distributor 40 further includes outlet channels 47 that separate a plurality of coplanar lands 46 spaced from heat transfer surface 12 by gaps 48. *Id.* Fluid travels downward through slots 44, through gaps 48, and through outlet channels 47. *Id.* ¶ 30.

5. *Anderson (Ex. 1015)*

Anderson is entitled “Method of Manufacturing a Cold Plate Heat Exchanger Assembly Having a Metallic Compliant Gasket.” Ex. 1015, Title. Figure 2, reproduced below, shows an exploded view of components of a cold plate heat exchanger assembly according to an exemplary embodiment. *Id.* ¶ 17.

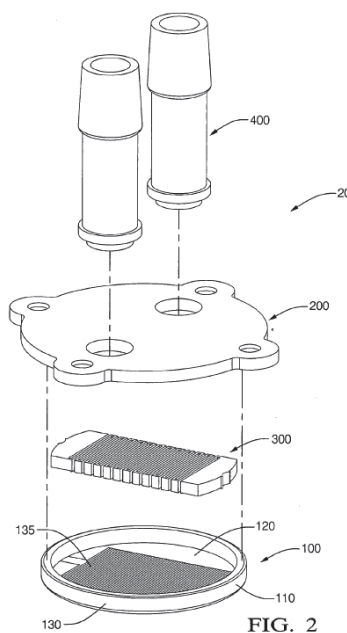


Figure 2 depicts cold plate heat exchanger assembly including inlet/outlet pipes 400, manifold cover 200, base plate 100, and manifold plate 300 positioned between manifold cover 200 and base plate 100. *Id.* ¶ 27.

Figure 4, reproduced below, shows an enlarged perspective view of surfaces of manifold plate 300 and base plate 100. Ex. 1015 ¶ 20.

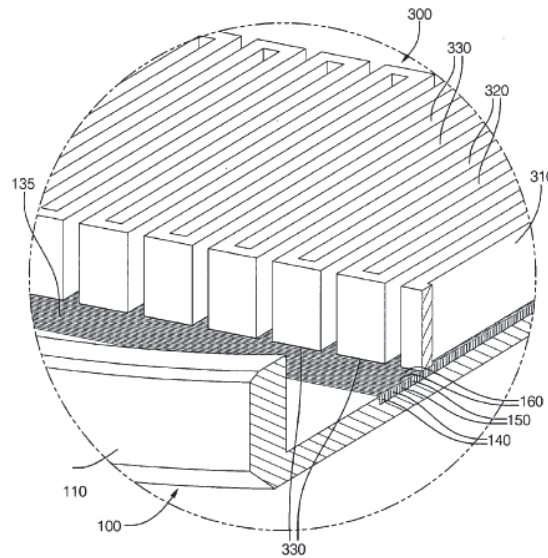


Figure 4 depicts base plate 100 including micro-channels 140 formed between micro-fins 150, and manifold plate 300 including channels 320. *Id.* ¶¶ 28, 30. Coolant enters alternating channels 320, flows down into micro-channels 140, and exits up into adjacent alternating channels 320. *Id.* ¶ 32.

E. Priority Date of '266 Patent Claims 1, 2, 4, 5, and 9

Petitioner's challenges to claims 1, 2, 4, 5, and 9 are based on Bezama and Lyon, which were published in 2010 and 2009, respectively, and Chiang, which issued in 2010. *See* Ex. 1010, code (43); Ex. 1011, code (43); Ex. 1013, code (45). Though the face of the '266 Patent contains a priority claim (via a continuation-in-part application) to the 2007 Provisional (Ex. 1001, code (60)), Petitioner contends that the 2007 Provisional did not disclose a "manifold body defin[ing] a pair of compliant surfaces" as recited

in independent claim 1 and incorporated by way of dependence into claims 2, 4, 5, and 9. Pet. 17–18 (alteration in original). According to Petitioner, the first disclosure of any compliant surface¹³ took place in the separate 2011 Provisional, filed on July 27, 2011. Pet. 19–20; Ex. 1006, 1.¹⁴ Because Bezama and Lyon were published prior to the filing of the 2011 Provisional, Petitioner contends both references qualify as prior art to independent claim 1 and dependent claims 2, 4, 5, and 9. Pet. 20, 23, 39.

Patent Owner argues in response that claims 1, 2, 4, 5, and 9 are entitled to the priority date of the 2007 Provisional, and that Lyon, Bezama, and Chiang thus do not qualify as prior art. Resp. 20–21, 36.

“[A] patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. § 112.” *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008) (quoting *In re Chu*, 66 F.3d 292, 297 (Fed. Cir. 1995)). The test for determining compliance with the written description requirement under 35 U.S.C. § 112 is whether the original disclosure of the earlier-filed application reasonably would have conveyed to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of the earlier-filed application. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). This

¹³ Petitioner further contends that the 2011 Provisional does not adequately support the “manifold body defin[ing] a pair of compliant surfaces” limitation (*see* Pet. 18 (alteration in original)), but we need not address that argument here because Lyon and Bezama were published before the 2011 Provisional was filed.

¹⁴ Our citations to the 2007 and 2011 Provisional refer to the exhibit page numbers stamped at the bottom of each page.

analysis requires “an objective inquiry into the four corners of the specification.” *Id.* Possession of the claimed subject matter is shown “by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997). Possession may not be demonstrated by merely showing that the claimed subject matter “would be obvious over what is expressly disclosed.” *Id.*

For the reasons that follow, we determine that the 2007 Provisional does not contain a disclosure that would have conveyed to a POSITA that the inventor had possession of a “manifold body defin[ing] a pair of compliant surfaces” of the type required by claim 1. Accordingly, the earliest-possible priority date of the ’266 Patent is July 27, 2011, the filing date of the 2011 Provisional.¹⁵

Patent Owner alleges that the 2007 Provisional reasonably conveys to a POSITA that the inventor had possession of a manifold body made of compliant material, namely plate 240. Resp. 21. The paragraphs from the 2007 Provisional specification that discuss plate 240 are reproduced below.

A plate 240 may be installed over the walls 210 to close off the channels across the upper limits of walls 210. Plate 240 has portions removed to create openings 214 and 224 in the final heat

¹⁵ The only other pre-2012 application to which the ’266 Patent claims priority is U.S. Patent Application No. 12/189,476 (*see* Ex. 1001, codes (60), (63)), which was subsequently published as the Lyon reference (*see* Ex. 1011, code (21)). Patent Owner never argues that the ’266 Patent is entitled to the priority date of this application, or contends that this application contains any additional disclosure of a “manifold body defin[ing] a pair of compliant surfaces” beyond that set forth in the 2007 Provisional. *See* Resp. 20–30. Accordingly, any such argument is deemed waived. *See* Paper 13, 8 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”)

IPR2020-00825

Patent 10,274,266 B2

exchanger. Tabs 242 may be used to assist with the positioning and installation of plate 240, wherein tabs 242 are bent down over the two outermost walls.

Seal 230 may be installed as a portion of plate 240 or separately.

After plate 240 and seal 230 are positioned, a top cap 244 can be installed over the assembly. Top cap 244 can include side walls that extend down to a position adjacent heat spreader plate.

Ex. 1005, 14. Plate 240 is also depicted in Figures 4 and 5. *See id.* at 16.

We have reviewed the 2007 Provisional in its entirety, and nothing in the 2007 Provisional describes the material of which plate 240 is made, much less indicates that the inventor had possession of an invention including a manifold body (i.e., plate 240) defining a pair of compliant surfaces. *See generally* Ex. 1005.

The earliest explicit disclosure of compliant surfaces in the file history of the '266 Patent appears in the 2011 Provisional, which contains the following description of insert body 360:

In a working embodiment, the body 360 is formed of a compliant polymeric material that generally conforms to and seals against adjacent surfaces. Any suitable material can be used to form the insert body 360, provided that the selected material is compatible with other components of the subassembly 300 and the selected working fluid.

Ex. 1006, 26. Several pages later, the 2011 Provisional describes the benefits of compliant insert 334:

By incorporating the compliant insert 334, secondary machining operations that would tend to dull the sharp apices 405 can be eliminated to reduce heat losses in the coolant, while still reducing or eliminating leakage between adjacent microchannels that might otherwise occur from using “raw” fins due to gaps that would be formed between the fins and, e.g., a generally planar plate 240.

Id. at 29. This portion of the 2011 Provisional contrasts compliant insert 334 with plate 240, indicating that using a compliant insert 334 rather than plate 240 would avoid “secondary machining operations” that would otherwise be necessary to reduce or eliminate gaps between plate 240 and the fins. This is objective, intrinsic evidence that the inventor, as of 2011, did not consider plate 240 to be made of what he described in the 2011 Provisional as being compliant material.

The 2011 Provisional also contains claims that recite a manifold body that “comprises a compliant portion urging against a corresponding portion of each of the distal edges,” a “complaint portion of the manifold body” that “generally conforms to the non-linear contour” of distal edges,” and “an insert [body] having a compliant body and being configured to matingly engage the second side of the housing and to straddle the inlet manifold recess.” Ex. 1006, 41, 45.

All references in the ’266 Patent to a “compliant body” appear to derive from disclosures that were added in the 2011 Provisional. The disclosure in the ’266 Patent of a manifold body that “can have a compliant portion urging against at least a portion of each of the distal edges” that can “generally conform to the non-linear contour” of the edges (*see* Ex. 1001, 4:16–23) is almost identical to recitations in claims 34 and 35 of the 2011 Provisional (*see* Ex. 1006, 41). The disclosure in the ’266 Patent of body 360 “formed of a compliant polymeric material that generally conforms to and seals against adjacent surfaces” (*see* Ex. 1001, 16:4–10) is almost identical to and appears to derive from a disclosure in the 2011 Provisional (*see* Ex. 1006, 26). The disclosure in the ’226 Patent of “compliant insert 334, which can urge against and form a seal with uneven fins” is also nearly identical to and appears to derive from a disclosure in the 2011 Provisional,

except that the named inventor replaced the term “a generally planar plate 240” with “a generally planar, rigid plate.” *Compare* Ex. 1001, 17:47–56, *with* Ex. 1006, 26. The inventor’s substitution of the phrase “rigid plate” for the phrase “plate 240” is objective, intrinsic evidence that as of 2012,¹⁶ the inventor considered plate 240 (which he was contrasting with compliant insert 334) to be made of a rigid, rather than compliant, material.

Patent Owner points out that Section 112 has no *in haec verba* requirement, and that the fact the 2007 Provisional never uses the term “compliant” is not proof that the 2007 Provisional fails to show that the inventor had possession of a manifold body defining a pair of compliant surfaces. Resp. 21–22. Patent Owner is correct in its description of the law. However, Patent Owner has not identified anything in the 2007 Provisional that demonstrates that the inventor possessed this aspect of ’266 Patent claim 1; and based on our own review of the 2007 Provisional, we are persuaded that there is no such disclosure.¹⁷

Patent Owner argues that the 2007 Provisional discloses “a monolithic plate 240 and seal 230” that include “bendable tabs 242, which are monolithic with plate 240.” Resp. 22. According to Patent Owner, “[a]s tabs 242 are bendable and compliant, a POSITA would have understood the rest of monolithic, continuous plate 240 to be equally bendable and

¹⁶ The ’266 Patent is a continuation of an application that was filed on February 21, 2012 (*see* Ex. 1001, code (63)).

¹⁷ In its Preliminary Response, Patent Owner raised inherency-based arguments that we rejected in our Institution Decision. *See* Resp. 22; Paper 6, 35–39; Paper 12, 18–20. Patent Owner chose not to maintain these inherency arguments in its Response. *See* Resp. 22–30. Accordingly, Patent Owner waived those arguments. Paper 13, 8. Even if Patent Owner had not waived these arguments, they would be unpersuasive for the reasons discussed in our Institution Decision. *See* Paper 12, 18–20.

compliant.” Resp. 23 (citing Ex. 2038 (Pokharna declaration) ¶ 66). Patent Owner further reasons that the 2007 Provisional discloses “two alternative assembly methods: (1) the parts may be connected during assembly; or (2) the parts can be connected by overall fusing techniques after assembly.” *Id.* at 24 n.8 (citing Ex. 2038 ¶ 67). Based on this assertion, Patent Owner argues that if the components were “connected during assembly” and afterward “by overall fusing techniques,” a POSITA would have recognized that plate 240 would have had to have been made of a compliant material in order to perform a “gasketing or sealing function.” *Id.* at 23–24 & n.8 (citing Ex. 2038 ¶ 67). Patent Owner further reasons that “seals made from compliant materials were notoriously well-known before August 9, 2007.” *Id.* at 25 (citing Ex. 2038 ¶¶ 67–68). These arguments and the supporting testimony from Dr. Pokharna are weak on several levels and fall far short of demonstrating to a POSITA that the inventor had possession of a manifold body defin[ing] a pair of compliant surfaces in 2007.

As Petitioner correctly points out, nothing in the 2007 Provisional indicates that seal 230, plate 240, and tabs 242 are necessarily made of the same material. Though it is certainly possible that seal 230, plate 240, and tabs 242 could be made of the same material (*see* Sur-Reply 2; Ex. 2040 (second Tilton deposition), 114:8–115:19; Ex. 2050 (first Tilton deposition), 78:6–15), the 2007 Provisional also states that parts may be connected by fusing techniques. Reply 4–5 (citing Ex. 1005, 14). Thus, even if the 2007 Provisional reasonably conveyed to a POSITA, for example, that the inventor had possession of a compliant seal, it would not follow that the inventor had possession of an embodiment in which all three of these components were made of the same, compliant material.

Moreover, Patent Owner’s assertion that the 2007 Provisional discloses two different types of assembly techniques misconstrues the 2007 Provisional. After describing the components depicted in Figures 4 and 5, the 2007 Provisional states “The parts may be connected during assembly thereof or afterward by overall fusing techniques.” Ex. 1005, 14. Based on the surrounding context and the sentence structure, we determine that this language describes when the parts may be connected (i.e., “during assembly or afterward”) and how they may be connected (i.e., “by overall fusing techniques”). *See id.* Patent Owner effectively asks us to insert a comma after the word “thereof,” and construe this language to create a dichotomy between two different methods of manufacture (i.e., during assembly by some technique other than fusing, or alternatively after assembly by overall fusing techniques). But there is no comma after the word “thereof,” and this language only describes one method of connecting components—overall fusing techniques. It does not follow from this language that the inventor envisioned a second method of connecting components in which compliant surfaces would have been desirable.

We also find that a POSITA would not have concluded from the 2007 Provisional that the inventor possessed the concept of making plate 240 of a conforming material in order to perform what Patent Owner calls a “gasketing or sealing function.” Resp. 23–24. As discussed above, a “seal,” as that term is used in the ’266 Patent, need not completely prevent all leakage. *See supra* § II.C.1. Moreover, as Petitioner points out, the specification discloses that “secondary machining operations” can be used to form a seal between the fins and a rigid plate. Reply 10 (citing Ex. 1001, 15:60–63). Nothing in the 2007 Provisional would have indicated to a

POSITA that the inventor envisioned making plate 240 of a compliant material in order to perform a gasketing or sealing function.

Furthermore, even if a POSITA would have been aware that seals could have been made of compliant materials (*see* Resp. 24–25), this is not persuasive evidence that the 2007 Provisional would have demonstrated to a POSITA that the inventor possessed the idea of a compliant seal in the embodiments disclosed therein, much less a manifold body defining a pair of compliant surfaces.

In addition, we agree with and credit Dr. Tilton’s opinion that the fact that tabs 242 may be “bendable” does not demonstrate that those tabs are “compliant.” *See* Ex. 1032 (Tilton supplemental declaration)

¶¶ 2–4. The specification of the ’226 Patent describes an insert body 360 “formed of a compliant polymeric material that generally conforms to and seals against adjacent surfaces” such as “silicone or any other suitably compliant material.” Ex. 1001, 16:4–12. Though we do not read this part of the specification as limiting, and neither party proposes a construction of “compliant,” the usage of this term in the specification is consistent with Dr. Tilton’s testimony that this term refers to materials that would conform to adjacent surfaces. *See* Ex. 1032 ¶ 4. We agree with Dr. Tilton that the fact that a material may be bent (i.e., undergo plastic deformation) does not demonstrate that that material is compliant. *See id.* ¶¶ 3–4. Dr. Pokharna’s testimony to the contrary is conclusory and unpersuasive because Dr. Pokharna does not cite any evidence or offer any reasoning for why a POSITA allegedly would have understood that a “bendable” tab would have been made of a compliant material. *See* Ex. 2038 ¶¶ 45–45, 66.

Patent Owner also argues that the disclosure in the 2007 Provisional of “fusing techniques,” and the added disclosure in the 2011 Provisional of

compliant materials, are “consistent with” plate 240 in the 2007 Provisional being made of a compliant material. Resp. 25–28. But even if Patent Owner is correct, this “consistent with” evidence does not demonstrate that the inventor actually possessed a manifold body defining a pair of compliant surfaces in 2007, much less that the four corners of the 2007 Provisional would have conveyed to a POSITA that the inventor was in possession of this aspect of claim 1.

Patent Owner additionally argues that some of Dr. Tilton’s testimony on compliant surfaces has been inconsistent and is not persuasive. Resp. 28–30. We have considered these arguments in analyzing Dr. Tilton’s testimony, and find that they do not substantially undermine any opinions of Dr. Tilton that we rely on in this decision.

For the foregoing reasons, we determine on this record that the 2007 Provisional would not have conveyed to a POSITA that the inventor was in possession of a manifold body defining a pair of compliant surfaces of the type recited in claim 1. Accordingly, the 2007 Provisional does not provide adequate support for claim 1, or dependent claims 2, 4, 5, and 9, under 35 U.S.C. § 112, and the earliest-possible priority date of these claims is the July 27, 2011, filing date of the 2011 Provisional. *See* Ex. 1006.

F. Alleged Anticipation of Claims 1 and 9 by Bezama

Petitioner alleges that Bezama discloses each limitation of claims 1 and 9, and cites testimony from Dr. Tilton in support of these assertions. Pet. 23–39 (citing Ex. 1003 ¶¶ 70–86). Patent Owner does not dispute that Bezama discloses all limitations of claims 1 and 9. *See* Resp. 26. Patent Owner’s only argument for patentability is an assertion that claims 1 and 9 are entitled to the priority date of the 2007 Provisional, and that Bezama thus does not qualify as prior art. *See id.*

We find on this record that Petitioner has persuasively shown that Bezama discloses all limitations of claims 1 and 9. *See* Pet. 23–39; Ex. 1003 ¶¶ 65–86. Patent Owner’s attempt to disqualify Bezama as prior art fails because claims 1 and 9 are not entitled to a priority date earlier than July 27, 2011. *See supra* § II.E.

On this record, and considering all of the evidence and arguments put forth by the parties, we find that Petitioner has shown by a preponderance of the evidence that claims 1 and 9 are unpatentable as anticipated by Bezama.

G. Alleged Obviousness of Claims 1 and 9 over Bezama and Lyon

Because claims 1 and 9 are unpatentable as anticipated by Bezama, we decline to consider the merits of Petitioner’s contention that claims 1 and 9 are also obvious and unpatentable over Bezama and Lyon. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. Apr. 30, 2020) (non-precedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

H. Alleged Obviousness of Claims 2, 4, and 5 over Bezama and Chiang

Petitioner identifies portions of Bezama and Chiang that allegedly teach or suggest each limitation recited in claims 2, 4, and 5, and these contentions are supported by testimony from Dr. Tilton. *See* Pet. 54–66; Ex. 1003 ¶¶ 114–137. Petitioner additionally identifies rationales for why a person of ordinary skill in the art would have had reason to combine the teachings of Bezama and Chiang to arrive at the inventions recited in those claims. *See id.*

Patent Owner does not dispute that Bezama and Chiang teach or suggest each limitation of claims 2, 4, and 5, or that a POSITA would have had a sufficient rationale for combining the teachings of Bezama and Chiang to arrive at the inventions recited in those claims. *See* Resp. 26. Patent Owner's only argument for the patentability of claims 2, 4, and 5 is an assertion that these claims are entitled to the priority date of the 2007 Provisional, and that Bezama and Chiang thus do not qualify as prior art. *See id.*

We find on this record that Petitioner has persuasively shown that Bezama and Chiang teach or suggest all limitations of claims 2, 4, and 5, and that a POSITA would have had a reason to combine these teachings and suggestions to arrive at the inventions recited in these claims. *See* Pet. 54–66; Ex. 1003 ¶¶ 114–137. Patent Owner's attempt to disqualify Bezama and Chiang as prior art fails because claims 2, 4, and 5 are not entitled to a priority date earlier than July 27, 2011. *See supra* § II.E.

On this record, and considering all of the evidence and arguments put forth by the parties, we find that Petitioner has shown by a preponderance of the evidence that claims 2, 4, and 5 are unpatentable as obvious over Bezama and Chiang.

I. Alleged Obviousness of Claims 2, 4, and 5 over Bezama, Lyon, and Chiang

Because claims 2, 4, and 5 are unpatentable as obvious over Bezama and Chiang, we decline to consider the merits of Petitioner's contention that claims 2, 4, and 5 are also obvious and unpatentable over Bezama, Lyon, and Chiang. *See SAS*, 138 S. Ct. at 1359; *Boston Sci. Scimed.*, 809 F. App'x at 990.

J. Alleged Obviousness of Claims 13–15 over Kang

Claim 13 is independent, and claims 14 and 15 depend from claim 13.

Ex. 1001, 21:8–22:15. Claim 13 is reproduced below.

13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:

- a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;

- a plate overlying the walls; and

- a seal, wherein the seal is a portion of the plate;

- a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;

- a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel, wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends, wherein the seal separates the fluid inlet passage from the fluid outlet passage;

- wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel, wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends, wherein the two sub flows recombine in the outlet passage.

Id. at 21:8–36.

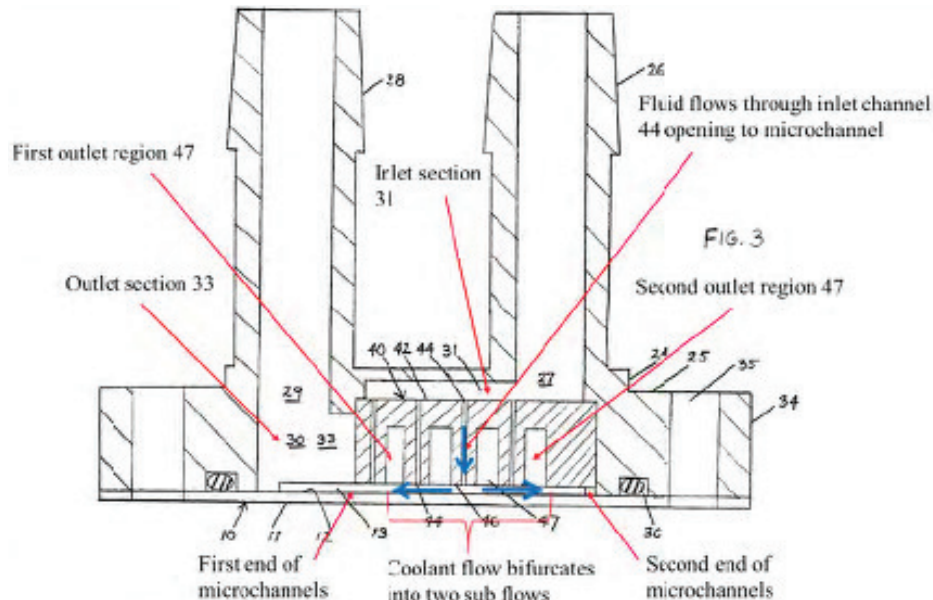
The following aspects of claim 13 are important to the analysis that follows. Claim 13 provides that each microchannel “extends from a first end to a second end,” so the “first end” and “second end” are necessarily located at the opposite ends of each microchannel. Claim 13 recites “one aperture in

the plate” through which fluid flows “at a position between the corresponding first end and the corresponding second end of the respective microchannel.” Claim 13 also recites a “first outlet region positioned adjacent to the microchannel first ends,” and a “second outlet region positioned adjacent to the microchannel second ends.” Accordingly, the first and second outlet regions are located “adjacent to” the opposing ends of the microchannels, and the one aperture is located somewhere between the opposing ends of the microchannels. Claim 13 further requires that “a flow of the heat exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel, wherein the first outlet region receives one of the two sub flows adjacent to the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent to the microchannel second ends.”

Accordingly, for claim 13 to be satisfied, there must be a flow of heat exchange fluid that is bifurcated into (i.e., divided into two) sub flows within each of the microchannels, and each of these separate sub flows within a given microchannel must be received by one of the two outlet regions adjacent to the opposing ends of the microchannels. In the discussion below, we refer to this as the “bifurcated flow” limitation of claim 13.

Petitioner contends that Kang teaches or suggests all limitations of claims 13–15, and Petitioner relies on testimony from Dr. Tilton for support. *See* Pet. 73–88; Ex. 1003 ¶¶ 155–189.

In the Petition, Petitioner uses an annotated version of Kang's Figure 3, reproduced below, to illustrate its contention that Kang teaches or suggests the bifurcated flow limitation of claim 13.



Pet. 84; Ex. 1014, Fig. 3. The figure above depicts flow distributor 40 having four inlet channels 44, and four outlet channels 47. *See* Pet. 84. Petitioner indicates with a blue, downward-facing arrow that one of these inlet regions receives a fluid flow. *See id.* Petitioner indicates with sideways-facing blue arrows that this fluid flow bifurcates into two sub flows, one of which travels to the left-most outlet channel (which Petitioner identifies as the first outlet region), and one of which travels to the right-most outlet channel 47 (which Petitioner identifies as the second outlet region). *See id.*

We observed in our Institution Decision, however (*see* Paper 12, 35), that Kang's flow distributor 40 (allegedly the "plate" recited in claim 13) includes multiple alternative inlet channels 44 and outlet channels 47. *See* Pet. 78–82, Ex. 1014, Fig. 3. These alternating channels are positioned in such a manner that the flow from any inlet channel 44 into a particular

microchannel would need to pass multiple other inlet channels 44 and outlet channels 47 before reaching both outermost ends of the microchannel (i.e., the “first end” and “second end” of the microchannel). It is not apparent from the Petition why the Petitioner-identified sub-flows would exit only when reaching the outer-most outlet channels (i.e., the Petitioner-identified outlet regions), as Petitioner depicts with blue arrows, rather than exiting through one of the intervening outlet channels. Paragraph 182 of Dr. Tilton’s declaration, which Petitioner cites in support of this contention, is conclusory in nature, and does not persuasively explain why each of the two Petitioner-identified sub flows would bypass intermediate outlets and exit at the outer-most outlets.

Patent Owner argues in its Response that Kang does not satisfy the bifurcated flow limitation of claim 13. Resp. 46–52. In particular, Patent Owner asserts, with support from Dr. Pokharna, that the fluid entering any of Kang’s inlet channels 44 would mix with fluid from adjacent inlet channels, and that the bulk of the fluid from any inlet channel would exit through adjacent outlet channels, rather than traveling to the outer-most outlet channels as Petitioner suggests. *Id.* at 47–48; Ex. 2038 ¶¶ 105–114. Patent Owner’s argument is persuasive and supported by well-reasoned testimony from Dr. Pokharna. For example, Dr. Pokharna correctly points out that Dr. Tilton has admitted that microchannels have high flow resistance. Ex. 2038 ¶ 112 (citing Ex. 1003 ¶ 158). We agree with Dr. Pokharna that because of this high flow resistance, fluid entering a microchannel through any inlet channel 44 would tend to exit through the path of least resistance (i.e., the nearest outlet channel 47) rather than traveling to each end of the microchannel and exiting through the most distant outlets. *See id.* ¶ 112.

In its Reply, Petitioner does not directly dispute Patent Owner’s contention that in Kang that the bulk of any fluid entering a microchannel would exit through the closest outlet channel 47. *See* Reply 17–18. Instead, Petitioner contends that at least some portion of the fluid will reach each end of the microchannel. *See id.* This argument is not persuasive because claim 13 recites that the flow that enters each channel through the one aperture “bifurcates into two sub flows,” and requires that each of the recited outlet regions receives “one of the two sub flows” or “the other of the two sub flows.” This claim language is not satisfied by an outlet region that receives only a portion of one of the two recited sub flows. Claim 13 requires that each outlet region receive one of the same two sub flows that originally entered the microchannel. *See also* Ex. 2038 ¶ 108. Petitioner neither proposes a claim construction that would encompass such an embodiment, nor offers any persuasive evidence that a POSITA would read claim 13 to encompass such an embodiment. Accordingly, on this record, we are not persuaded by a preponderance of the evidence that Kang teaches or suggests a flow of heat exchange fluid that is bifurcated into two sub flows within each of the microchannels, wherein each of these two sub flows is received by one of the two outlet regions adjacent to the opposing ends of the microchannels, in the manner required by claim 13.

Petitioner also makes an alternative argument that a POSITA would have been motivated to modify Kang’s flow distributor 40 by eliminating all but one inlet channel 44, and all but two outlet channels 47, in order to “simplify manufacturing complexities and costs,” and that such a modified embodiment would satisfy the bifurcated flow limitation of claim 13. Pet. 75–76, 85–86 (citing Ex. 1003 ¶¶ 164–166). Petitioner, however, does not propose to combine Kang with a second prior art reference that allegedly

satisfies the bifurcated flow limitation of claim 13. *See id.* Instead, Petitioner relies solely on the knowledge that a POSITA allegedly would have possessed to supply this missing limitation. *See id.*

In *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355 (Fed. Cir. 2016), the Federal Circuit noted that “there are at least three caveats to note in applying ‘common sense’ in an obviousness analysis.” *Id.* at 1361. “First, common sense is typically invoked to provide a known motivation to combine, not to supply a missing claim limitation.” *Id.* Second, in the only prior case identified by the *Arendi* parties in which common sense was used to supply a missing claim limitation, “the limitation in question was unusually simple and the technology particularly straightforward.” *Id.* at 1362. Thus, that case “ought to be treated as the exception, rather than the rule.” *Id.* Third, common sense “cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art reference specified.” *Id.*

Here, Petitioner is relying on the common sense knowledge that a POSITA allegedly would have possessed to supply the bifurcated flow limitation of claim 13. Accordingly, this is an unusual situation.

Moreover, the technology at issue is not simple, and it is apparent that multiple modifications to Kang would likely be necessary for success. For example, Dr. Tilton concedes that merely eliminating three inlet channels and two outlet channels would not necessarily yield a successful product. Ex. 1003 ¶ 106. These modifications to the inlet and outlet channels would increase flow resistance through the microchannels, possibly requiring further modifications to the microchannels to increase their hydraulic diameters and/or a higher capacity pump (which would be more expensive). *Id.* In addition, we agree with Dr. Pokharna’s well-reasoned opinion that

modifying the microchannels to increase their hydraulic diameters would reduce the cooling performance of the modified device. Ex. 2038 ¶ 119. On this record, we determine that technology and proposed modifications are not simple ones of the type that might justify relying on common sense to supply a missing claim limitation.

In addition, the evidentiary support for Petitioner's proposed modification is relatively weak. For example, Dr. Tilton does not provide any explanation or evidentiary support for his assertion that modifying Kang in the manner Petitioner proposes would simplify manufacturing or reduce complexities and costs. *See* Ex. 1003 ¶¶ 166, 184. This assertion is conclusory and unpersuasive. Petitioner has offered no persuasive rationale supported by evidence or reasoned analysis for why a POSITA would have been motivated to modify Kang in the manner it proposes.

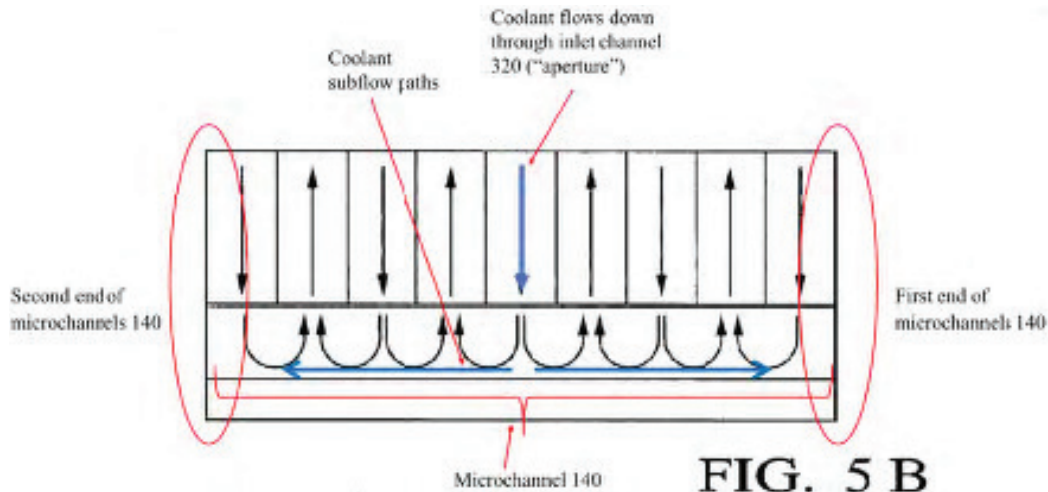
Weighing all of the evidence set forth by both parties, and mindful of the caveats set forth in *Arendi*, we are not persuaded by a preponderance of the evidence before us that a POSITA would have had a sufficient rationale to modify Kang's device in the manner that allegedly would have satisfied the bifurcated flow limitation of claim 13.

For the reasons set forth above, Petitioner has not demonstrated by a preponderance of the evidence that claims 13–15 would have been obvious over Kang.

K. Alleged Obviousness of Claims 13–15 over Anderson

Petitioner contends that Anderson teaches or suggests all limitations of claims 13–15, and Petitioner's relies on testimony from Dr. Tilton for support. *See* Pet. 88–105; Ex. 1003 ¶¶ 190–222.

In the Petition, Petitioner uses an annotated version of Anderson Figure 5B (reproduced below) to illustrate its contention that Anderson teaches or suggests the bifurcated flow limitation of claim 13.



Pet. 101; Ex. 1015, Fig. 5B. The figure above depicts multiple alternative inlets (denoted with downward arrows) and outlets (denoted with upward arrows). *See id.* According to Petitioner, fluid entering microchannels through inlet channel 321 (denoted with a downward-facing blue arrow) would split into two sub flows (indicated with sideways-facing blue arrows) within each microchannel, and that these sub flows would proceed outwardly towards the ends of the microchannels. Pet. 100–101.

As we noted in our Institution Decision, however (*see* Paper 12, 36–37), Anderson’s manifold plate 300 (allegedly the “plate” recited in claim 13) includes multiple “alternating inlet and outlet channels 320.” Pet. 96. These alternating channels are positioned in such a manner that the flow from any inlet channel into a particular microchannel would need to pass by multiple other alternating inlet and outlet channels before reaching the outer-most ends of the microchannel. *See* Pet. 92–93, 96–97. It is not apparent from the Petition why the Petitioner-identified sub-flows would remain in the microchannel until exiting through the outer-most outlet channels (i.e.,

the Petitioner-identified outlet regions), rather than exiting through one of the closer, intervening outlet channels. Paragraphs 193, 210, and 214 of the Tilton Declaration, which Petitioner cites in support of this assertion, are conclusory in nature and do not persuasively explain why fluid in each microchannel would flow outwardly to the ends of each microchannel, as Petitioner suggests. *See* Ex. 1003 ¶¶ 193, 210, 214–215.

Patent Owner argues in its Response that Anderson does not satisfy the bifurcated flow limitation of claim 13. Resp. 69–74. In particular, Patent Owner asserts, with support from Dr. Pokharna, that the fluid entering any of Anderson’s inlet channels 320 would mix with fluid from adjacent inlet channels, and that the bulk of the fluid from any inlet channel would exit through adjacent outlet channels 320, rather than traveling to the outermost outlet channels. *Id.* at 69–70; Ex. 2038 ¶¶ 144–145. We agree with Dr. Pokharna that because microchannels have high flow resistance (*see* Ex. 1003 ¶ 158), fluid entering a microchannel through any inlet channel would tend to exit through the path of least resistance (i.e., the nearest outlet channel) rather than traveling all the way to the end of the microchannel and exiting through the most distant outlets. *See* Ex. 2038 ¶ 150.

In its Reply, Petitioner does not directly dispute Patent Owner’s contention that in Anderson that the bulk of any fluid entering a microchannel would exit through the closest outlet channel 47. *See* Reply 23. Instead, Petitioner contends that at least some portion of the fluid will exit at the end of each microchannel. *See id.* This argument fails for substantially the same reasons Petitioner’s similar argument regarding Kang was not persuasive. As discussed above, Petitioner has not offered any persuasive evidence that the bifurcated flow limitation would be satisfied by an embodiment in which each outlet region receives only a portion of one of

the two recited sub flows. *See supra* § II.J. Accordingly, on this record, we are not persuaded by a preponderance of the evidence that Anderson teaches or suggests a flow of heat exchange fluid that is bifurcated into two sub flows within each of the microchannels, wherein each of these two sub flows is received by one of the two outlet regions adjacent to the opposing ends of the microchannels, in the manner required by claim 13.

Petitioner argues in the alternative that a POSITA would have been motivated to simplify Anderson's manifold plate to have a single inlet and two outlets in order to reduce manufacturing costs and complexities. Pet. 91, 101–102. According to Petitioner, this would have been a simple matter of design choice, not a matter of invention. *Id.* at 91. Petitioner again does not cite a different prior art reference that allegedly teaches the bifurcated flow limitation of claim 13, but instead relies on the knowledge that a POSITA allegedly would have had. *See id.* at 91, 101–102.

Because Petitioner is relying on the common sense knowledge that a POSITA allegedly would have possessed to supply the bifurcated flow limitation of claim 13, this is an unusual situation under *Arendi*.

The technology at issue also is not simple, and it is apparent that multiple modifications to Anderson would likely be necessary for such a product to succeed. Dr. Tilton concedes that merely eliminating inlet and outlet channels would not necessarily yield a successful product. Ex. 1003 ¶ 196. These modifications would increase flow resistance through the microchannels, possibly requiring further modifications to the microchannels to increase their hydraulic diameters and/or a higher capacity pump (which would be more expensive). *Id.* Furthermore, we agree with Dr. Pokharna's opinion that Petitioner's proposed modifications would decrease cooling performance. Ex. 2038 ¶¶ 153–156.

In addition, the evidentiary support for Petitioner’s proposed modification is relatively weak. Dr. Tilton does not provide any persuasive explanation or evidentiary support for his assertion that modifying Anderson in the manner Petitioner proposes would simplify manufacturing, reduce complexities and costs, or have been a simple design choice. *See* Ex. 1003 ¶¶ 194–196, 216. These assertions are conclusory in nature, and unsupported by evidence or reasoned analysis for why a POSITA would have been motivated to modify Anderson in the manner Petitioner proposes.

Weighing all of the evidence set forth by both parties, and mindful of the caveats set forth in *Arendi*, we are not persuaded by a preponderance of the evidence that a POSITA would have had a sufficient rationale to modify Anderson’s device in the manner that allegedly would have satisfied the bifurcated flow limitation of claim 13.

For the reasons set forth above, Petitioner has not demonstrated by a preponderance of the evidence that claims 13–15 would have been obvious over Anderson.

III. PATENT OWNER’S MOTION TO EXCLUDE

Patent Owner seeks to exclude Exhibit 1026, the transcript of the February 11, 2021, deposition of Geoff Lyon taken in a district court case. Paper 35, 1. According to Patent Owner, this deposition is hearsay and none of the exceptions to the hearsay rule applies. *Id.* at 4–7.

Petitioner does not dispute that Mr. Lyon’s deposition transcript is an out-of-court statement that it offers in this proceeding for the truth of the matters asserted therein. *See generally* Paper 38; *see also* Paper 43, 1 (“Petitioner does not dispute using out-of-court statements from Exhibit 1026 for their truth.”). Instead, Petitioner argues that Exhibit 1026 is not hearsay under Federal Rule of Evidence 801(d)(2)(D) because Mr. Lyon’s

testimony “was made by the party’s agent or employee on a matter within the scope of that relationship and while it existed.” *See* Paper 38, 1–8; Fed. R. Evid. 801(d)(2)(D). Alternatively, Petitioner contends that even if Exhibit 1026 is hearsay, we should admit Exhibit 1026 under the residual hearsay exception of Rule 807. *Id.* at 8–15.

On this record, we determine that when Mr. Lyon testified in the district court deposition, he was not an employee of Patent Owner. It is undisputed that Mr. Lyon was not employed by Patent Owner at the time he testified. *See* Paper 38, 3 (indicating that Mr. Lyon was not employed by Patent Owner after 2019). Mr. Lyon also testified in his personal capacity under Fed. R. Civ. P. 30(b)(1), and not as a corporate representative under Fed. R. Civ. P. 30(b)(6). *See* Paper 35, 1; Ex. 1026.

We also determine on this record that Mr. Lyon was not acting as an agent of Patent Owner while testifying at his deposition. *See* Paper 38, 5–8. “Ordinarily, an agency relationship arises only where the principal has the right to control the conduct of the agent with respect to matters entrusted to the agent.” 30B Fed. Prac. & Proc. Evid. § 6776 n.11, Wright & Miller (2021) (citing *Gilmore v. Palestinian Interim Self-Gov’t Auth.*, 843 F.3d 958, 970 (D.C. Cir. 2016)).

Petitioner argues that Mr. Lyon was obligated by an assignment (Exhibit 1033) to assist Patent Owner with asserting and enforcing patents and patent applications assigned to Patent Owner. Paper 38, 3. But Petitioner does not cite any case in which such boilerplate patent assignment language was sufficient to render an inventor agent of the assignee in a deposition taken years later. The assignment gives Patent Owner the right to request assistance from Mr. Lyon in the future, but Petitioner offers no evidence that when Mr. Lyon testified at deposition, he was acting pursuant

to such a request. *See* Ex. 1033. The assignment also does not state or imply that Mr. Lyon somehow has an open-ended authorization to act as Patent Owner’s agent in the future. *See id.*

Petitioner also cites a provision in Mr. Lyon’s 2019 termination agreement. Paper 38, 4. Petitioner, however, has not identified any evidence that when Mr. Lyon testified at deposition, he was doing so pursuant to an obligation imposed on him by this agreement. Petitioner also has identified nothing in the 2019 termination agreement that plausibly could be read as granting an open-ended authorization for Mr. Lyon to act in the future as an agent of Patent Owner.

For the foregoing reasons, Fed. R. Evid. 801(d)(2)(D) does not apply, and Exhibit 1026 is inadmissible hearsay absent an applicable exception to the hearsay rule.

Petitioner contends that we should admit Mr. Lyon’s deposition testimony under the residual exception of Federal Rule of Evidence 807. In order to be admissible under this exception, a hearsay statement must be “supported by sufficient guarantees of trustworthiness—after considering the totality of circumstances under which it was made and evidence, if any, corroborating the statement” and also be “more probative on the point for which it is offered than any other evidence that the proponent can obtain through reasonable efforts.” Fed. R. Evid. 807.

In this case, we find that Fed. R. Evid. 807 does not apply because Mr. Lyon’s testimony does not appear to be “more probative on the point for which it is offered than any other evidence the proponent can obtain through reasonable efforts.” Petitioner cites Mr. Lyon’s testimony to support its contention that the 2007 Provisional does not demonstrate that the inventor had possession of a manifold body defining a pair of compliant surfaces (*see*

Reply 2–4, 9–10), and its contentions that Kang and Anderson teach or suggest all limitations of claims 13–15 (*see id.* at 16–19). But the best evidence of what the 2007 Provisional demonstrates is the 2007 Provisional itself, supplemented by the testimony of someone Petitioner contends is qualified to testify from the perspective of a POSITA (i.e., Dr. Tipton). We are not persuaded that testimony from the named inventor, fourteen years after the fact, is “more probative” on the issue of what the 2007 Provisional demonstrates than the 2007 Provisional itself and the testimony of Dr. Tipton. Petitioner similarly fails to demonstrate that the testimony of Mr. Lyon concerning Kang and Anderson is somehow more probative than the testimony of, for example, Dr. Tipton.

We also find that Fed. R. Evid. 807 does not apply because Petitioner made no effort to take Mr. Lyon’s deposition during the course of this proceeding. Petitioner is correct in its assertion that the Board is “conservative in authorizing additional discovery.” Paper 38, 14. But if Petitioner really believed that Mr. Lyon’s testimony was critical, it should have sought his testimony in this proceeding. Having failed to do so, Petitioner cannot now argue that it could not have obtained Mr. Lyon’s in this proceeding through reasonable efforts.

For the foregoing reasons, we are persuaded the Exhibit 1026 is hearsay and no exceptions to the hearsay rule apply. Accordingly, Patent Owner’s motion to exclude is granted. This Decision does not cite to or rely on any portion of Exhibit 1026.

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner has shown by a preponderance of the evidence that challenged claims 1, 2, 4, 5, and 9 are unpatentable, but has not shown by a preponderance of the evidence that

IPR2020-00825

Patent 10,274,266 B2

challenged claims 13–15 are unpatentable.¹⁸ We also grant Patent Owner’s motion to exclude.

In summary, regarding the challenged claims:

Claim(s) Challenged	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 9	102	Bezama	1, 9	
1, 9	103	Bezama, Lyon ¹⁹		
2, 4, 5	103	Bezama, Chiang	2, 4, 5	
2, 4, 5	103	Bezama, Lyon, Chiang ²⁰		
13–15	103	Kang		13–15
13–15	103	Anderson		13–15
Overall Outcome			1, 2, 4, 5, 9	13–15

¹⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹⁹ For the reasons discussed above, we do not reach this ground.

²⁰ For the reasons discussed above, we do not reach this ground.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 4, 5, and 9 of U.S. Patent 10,274,266 B2 have been shown to be unpatentable, and that claims 13–15 have not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner’s Motion to Exclude is *granted*; and

FURTHER ORDERED that because this is a final written decision, parties to the proceeding seeking judicial review of this decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2020-00825

Patent 10,274,266 B2

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